LOW ENERGY TRAINING CARTRIDGE

TECHNICAL FIELD

The present invention relates to ammunition, particularly non-lethal ammunition intended for use in training and war games. The invention has particular application in cartridges in which a rearwards movement of a portion of the cartridge is used to initiate the recycling of an automatic or semi-automatic firearm.

BACKGROUND ART

Low energy cartridges for cycling self loading guns are widely known. For example US Pat. 5,677,505, US Pat. 6,095,051, US Pat. 5,700,972 and US Pat. 6,439,123 B1 all relate to a two part cartridge which has a casing slidable relative to a plug at the forward end of the cartridge. When the cartridge is loaded in a gun and fired, force provided by a propellant gas is employed to urge the slidable casing back against the breech-block and recycle the weapon.

An example of such a cartridge is illustrated in Fig.1 of the accompanying drawings. A problem that arises with these prior art cartridges is that they perform inconsistently when used in guns of the same calibre but made by different manufacturers. This is due to design variations between guns of different manufacturers, variations which the manufactures claim, when used in conjunction with live ammunition, provide certain technical advantages. These variations, discussed in more detail in the description of Figure 1 given below, can result in different degrees of gas loss and volume related pressure variations around the bullet.

The high energy associated with propulsion of live ammunition copes with these differences, however, the much smaller amount of

energy available to propel a bullet using prior art, low energy training ammunition cartridges does not cope well. Consequently, varying propellant gas loss and pressure variations associated with comparable weapons from different manufacturers significantly affects performance when these guns are used with low energy cartridges to an extent that, behaviour of the ammunition when fired from a weapon becomes inconsistent and unpredictable. The changes encountered in the ammunition performance from one gun type/make to another are considered unacceptable.

The present invention aims to provide a novel low energy cartridge which allows more consistent and predictable performance when firing non-lethal ammunition from weapons of the same calibre, but different manufacturer.

SUMMARY OF INVENTION

In accordance with the present invention there is provided a low energy cartridge comprising:

an outer casing;

a rear telescopically slidable portion disposed, in use, to be telescopically extendable with respect to the outer casing in a direction towards the breech-block of a firearm;

a front telescopically slidable portion disposed, in use, to be telescopically extendable with respect to the outer casing in a direction towards the barrel of a firearm;

means for causing each telescopically slidable portion, in use, too telescopically extend in reaction to firing of a firearm containing the cartridge;

an open end of the front portion configured to receive a projectile and

means for propelling a projectile from the open end.

Optionally the cartridge further includes a projectile received in the front portion of the cartridge, the projectile comprising a bullet which is configured such that, in use, the bullet remains sealed in the front portion of the cartridge until a portion of it has entered the rifled part of the barrel of the firearm.

Preferably, the means for causing the telescopically slidable portions to telescopically extend include a gas releasing device positioned to the rear of the rear telescopically slidable portion, an open ended gas passage extending through the portion and forwardly of the gas releasing device and a closure member sealingly slidably located in the gas passage. The gas releasing device may be a primer.

Conveniently, the means for causing the portions to telescopically slide comprise a primer positioned towards the rear of each of the front and rear telescopically slidable portions. Optionally, the means may comprise a primer positioned to the rear of the rear portion which in turn ignites a propellant charge causing both portions to telescopically slide. The propellant charge may also, optionally, propel a projectile seated in the gas passage of the front portion. Where a primer is present in the front portion, this primer may be initiated by percussion, for example on impact by the aforementioned closure member or, by chemical action of a component of gas released in the gas passage of the rear portion.

In use of a typical embodiment, the cartridge is loaded in the firearm with both telescopically slidable portions retracted into the outer casing. A projectile is positioned in the open end of the gas passage of the front portion. When the firearm is fired, the firing pin strikes the primer causing release of gas into the gas passage extending forwardly of the primer. As the gas expands, the closure member is caused to slide along the gas passage at increasing speed towards the primer of the second telescopically slidable portion. At the same time, the expanding gas forces

the rear telescopically slidable portion to extend towards the breach block of the firearm, travelling in an opposing direction to the closure member. As the closure member exits the open end of the extending rear portion, gas escapes the passage of the rear portion and expands into a space to the rear of the front portion. This causes the telescopically slidable front portion to extend towards the barrel of the firearm. Thus, the two telescopically slidable portions are caused to travel in opposing directions.

The accelerating closure member strikes the primer of the front portion causing release of a second quantity of gas into the gas passage extending forwardly of this second primer. As it expands, this second quantity of gas forces the projectile out of the open ended gas passage and into the barrel of the firearm.

It will be appreciated that the front telescopically slidable portion extends before the bullet is propelled through the barrel of the firearm. The portion thus creates a seal between the cartridge and the barrel to enable all of the propellant gas, without pressure drops or gas losses, to propel the bullet up the barrel. This overcomes inconsistencies in performance of cartridges in firearms of varying manufacturer's designs.

Desirably, the outer casing is shaped so as to include at or near each end an inwardly jutting surface which serves to stop the telescopically slidable portions separating from the outer casing when they extend. Optionally, the inwardly jutting surface comprises an annular flange having an inner radius which is slightly smaller than the largest radius of the corresponding, telescopically slidable portion.

The closure member is conveniently a plug which has a cross section in a direction perpendicular to the direction of travel of the telescopically slidable portions, of similar shape and size to that of the gas passage of the first telescopically slidable portion. Desirably, the closure

member is substantially spherical. The closure member may, optionally, comprise a steel ball. Alternatively, the closure member may comprise a ball of plastic material. The outer surface of the closure member is desirably selected to be of a low friction material so as to allow the member to easily slide along the gas passage when the first gas is released.

Desirably a gas tight seal is provided between at least the rear telescopically slidable portion and the outer casing and optionally also the front telescopically slidable portion and the outer casing.

Either or both of the primers may in turn ignite a propellant charge.

BRIEF DESCRIPTION OF DRAWINGS

For the purposes of exemplification, an embodiment of the invention will now be further described with reference to the following Figures in which;

Figure 1 shows schematically a typical cartridge as is known from the prior art, correctly located in the chamber of a firearm.

Figure 2 shows in cross section an embodiment of a telescopically expandable cartridge in accordance with the invention located in the chamber of a firearm, prior to firing;

Figure 3 shows the embodiment of Figure 2 shortly after the firearm has been fired but before the projectile is propelled into the barrel of the firearm;

Figure 4 shows the embodiment of Figure 3 at a later moment when the projectile has been propelled into the barrel of the firearm.

DESCRIPTION OF ILLUSTRATED EMBODIMENT

Figure 1 illustrates schematically a typical cartridge Z as is known from the prior art. In the figure, dimension A is a constant used by all firearm manufacturers for a given ammunition type. The cone shaped surface B is not common to all manufacturers designs and may be plane and smooth. Also, in some manufacturers firearms, the cartridge may make a seal between the rifled barrel X and the chamber Y or it may have grooves that run from the surface with dimension C across the cone shaped face and along the surface with dimension A thereby rendering it impossible to make a seal between the rifled barrel X and the chamber Y.

The dimensions C and D may vary from manufacturer to manufacturer as may diameters E and F. H represents the direction of extension of a telescopically expanding low energy cartridge during recycling.

The dimension I may vary from manufacturer to manufacturer. In addition, manufacturers use slightly varying breech and chamber dimensions and configurations (for example fluted chambers) for use with live ammunition.

The variations in the previously discussed design parameters of firearms of the same calibre but different manufacturer cause gas loss and volume related pressure variations around a bullet propelled from the firearm.

Figure 2 illustrates a cartridge in accordance with the invention. As can be seen from the Figure, the cartridge of the invention comprises an outer casing 4 in to which are telescopically slidably arranged a rear portion 1 and front portion 6. The rear portion includes a primer 2 sited to the rear of the portion where, in use, it can be initiated in striking by a firing pin of the firearm (not shown). At the opposing end of the rear

portion 1, on the outer surface of the portion 1 is an annular flange 9 which includes an annular recess which receives a sealing ring 10. The sealing ring 10 provides a gas tight seal which prevents gases released from the primer 2 escaping from the rear of the cartridge. Towards the rear of the outer casing 4 on an inner surface of the casing as an annular protrusion 8. the inner radius of the annular protrusion is selected to be smaller than the outer radius of the flange 9 such that, when the rear portion 1 extends, it is prevented from separating from the casing by flange 9 abutting against protrusion 8.

A gas passage 11 extends forwardly of the primer 2 in the rear portion 1. Carried within the gas passage 11 is a closure member which may be a steel or plastic ball 3 which has a diameter comparable to that of the diameter of the gas passage 11. The ball 3 acts as a closure member preventing the escape of gas released by the primer 2 from escaping through the open end of the gas passage 11. The ball 3 is, however, slidable within the gas passage 11.

The front portion 6 is made from plastic or composite construction of pliable material which serves to seal in the outer casing 4. The pliable nature of the material allows deformation at the interface between the front portion 6 and the entry to the barrel X maintaining a seal even if fluting is present. The front portion further comprises a second primer 5 sited towards its rear end. A second gas passage 12 extends forwardly of the second primer 5 and opens into a socket 13 configured to receive an end of a bullet or other projectile 7.

As for the rear portion, the smallest diameter (at position 14) of the front end of the casing 4 is smaller than the largest diameter (at position 15) of the front portion 6 so as to prevent separation of the front portion 6 from the casing 4 when the front portion telescopically extends.

In a desirable application of an embodiment of the invention, a bullet 7 is configured such that the bullet 7 remains sealed in the socket 13 of the pliable front portion 6 of the cartridge until the it has entered the rifled part X of the barrel of the firearm. This may be achieved by providing a bullet 7 with a parallel section 7a, sealed in the socket 13 of the pliable front portion 6.

Figure 3 shows the initial action of the cartridge of Figure 2 when the firearm is fired. On firing, a firing pin P strikes the primer 2 in of the rear portion 1 which causes gas to be released into gas passage 11. The pressure of the gas in passage 11 causes ball 3 to travel towards the front portion 6. As the ball begins to exit the gas passage 11, gas escapes past the ball and begins to force the front 6 and rear 1 portions apart. The rear portion 1 extends telescopically towards the breech of the firearm so as to recycle the firearm as is known from the prior art.

As can be seen from Figure 4, the front portion 6 also telescopically extends so as to seal the front pliable portion at the interface between the guns chamber Y and the barrel X and deposit the front end of the projectile 7 into the barrel X of the firearm. The ball 3 strikes the primer 5 of the front portion 6 causing release of gas into gas passage 12. The released gas builds up a pressure behind projectile 7 which ultimately forces the projectile along the barrel X.